

Hooker, Milde, and in the earlier editions of Newman. In North America the order is represented by 139 species and 31 genera. The number of species is quite double what we have in the whole of Europe. The northern area outside the United States produces very few species that have not been found within the bounds of the Union. As in Europe there are no Cyatheaceæ, Marattiaceæ, nor Gleicheniaceæ. Of the other sub-orders the Schizæaceæ, which we do not possess, are represented in the United States by three genera and four species. Ceratopteris, of which Prof. Eaton makes a special sub-order, is also American, but not European. The other four sub-orders—Polypodiaceæ, Hymenophyllaceæ, Osmundaceæ, and Ophioglossaceæ—are represented, both in America and Europe. One peculiarity of ferns is that the genera show exceedingly little tendency to geographical localisation. The nearest approach to this that we have in North America is the predominance of Pellæa, Cheilanthes, and Nothochlæna, which are allied dwarf types with a greater power of resisting drought than any other set of ferns, and which are represented in this area by a large proportionate number of endemic species. These three genera take up thirty-nine species in North America against four for Europe. Out of the 139 species about forty are endemic, and about forty are European, the latter including several of our high mountain types, such as *Cystopteris montana*, *Aspidium Lonchitis*, *Polypodium alpestre*, *Woodsia ilvensis*, *glabella*, and *hyperborea*. The southern boundary of the States corresponds broadly with the limit in a northern direction of the great tropical flora of Equatorial America, the richest tropical flora in the world. But out of the 139 ferns at least twenty are characteristically widely-spread tropical species which do not extend beyond Florida, which have several of them only been discovered there within the last few years. Such are *Ophioglossum palmatum*, *Aerostichum aureum*, *Polypodium aureum*, *P. Phyllitidis*, *P. Plumula*, and *P. pectinatum*, *Vittaria lineata*, and *Nephrolepis exaltata*. Amongst the remaining species there are some curious cases of a rôle of distribution it is difficult to explain or understand. *Adiantum pedatum* and *Osmunda cinnamomea* are examples in ferns of a considerable group of American plants which reach Asia by way of Japan and run down through China to the Eastern and Central Himalayas; *Pteris serrulata*, found lately in America in Alabama, and South Carolina, reappears only in China; *Pellæa andromedæfolia*, which from California passes down the Andes to Chili, reappears in Cape Colony. *Nothochlæna tenera* is supposed to be divided between Southern Utah and the Andes of Bolivia and Chili, but here I think that the States plant will most likely have to rank as a distinct species. *Aspidium mohrioides*, long supposed to be endemic in extra-tropical South America, has been discovered lately by Mr. Moseley in Marion Island, and by Mr. Lemmon in one place at an elevation of 8000 feet above sea-level amongst the mountains of California.

As regards the limitation of genera and species Prof. Eaton differs but little from Sir William Hooker, as the English author's views are expounded in his great monograph of the ferns of the whole world, his "Species Filicum." Prof. Eaton treats Hymenophyllaceæ and Ceratopterideæ as distinct sub-orders; the former at any

rate a decided improvement upon Sir W. Hooker's classification, and he maintains Ophioglossaceæ as a distinct order. In genera the principal deviations are that he keeps up Phegopteris as distinct from Polypodium, and merges Nephrodium in Aspidium.

A very curious North American fern is *Asplenium ebenoides* of Scott. It is very rare, and always grows in company with the walking leaf (*Camptosorus rhizophyllus*) and *Asplenium ebenum*, two common American species. These are very dissimilar plants, but *A. ebenoides* is quite intermediate between them. Prof. Eaton seems not disinclined to the idea that it may be produced by natural hybridisation, as was suggested by the Rev. M. J. Berkeley in the *Journal* of the Royal Horticultural Society for 1866, p. 87.

An observation of Prof. Eaton's under *Nothochlæna Fenaleri* is interesting as bearing upon Milde's classification of ferns into a catadromous and anadromous series, according as to whether their lowest secondary branches originate on the posterior or anterior side of the pinnae. Prof. Eaton notes that in this species there is always a decided inequality in their origin; but that it is sometimes on the anadromous, and at others on the catadromous plan.

J. G. BAKER

KÖLLIKER ON ANIMAL DEVELOPMENT

Grundriss der Entwicklungsgeschichte des Menschen u. der höheren Thiere. Von Albert Kölliker, Professor der Anatomie an der Universität Würzburg. (Leipzig: W. Engelmann, 1880.)

THIS book is essentially a reproduction of Prof. Kölliker's large treatise on Embryology, with a great part of the detail and controversial matter omitted, and is intended for the use of medical students. The larger work has more the character of a monograph on the development of birds and mammals than of a text-book; and as such, though of very great value to those engaged in teaching and research, is necessarily too bulky for the use of ordinary students. We think, therefore, that Prof. Kölliker has done very wisely in publishing the work before us; and we need hardly say that, his larger treatise having been already universally recognised as one of the most important contributions to embryology during recent years, the present work may safely be regarded as an accurate statement of the facts of avian and mammalian embryology. We may add that no trouble has been spared in the illustrations, which fully come up to the high standard characteristic of German works of this class.

While, however, we can say this much in praise of Prof. Kölliker's treatise, we cannot help recognising that it has some rather serious defects. Prof. Kölliker is an extremely objective writer. He describes with great clearness the objects as they present themselves to the observer, but he scarcely ever attempts to connect them together or to point out the general principles which underlie the mass of detail with which he has to deal. In his larger work this peculiarity is of comparatively small importance, in that those who are likely to use it are able to supply the general principles for themselves; and the work has already become a great mine of facts to which every anatomist who is engaged in studying the morphology of vertebrates will necessarily turn.

In a book however intended for medical students, it is, in our opinion at least, of the utmost importance that the facts of embryology should not merely be stated in succession, but that their significance should be pointed out. Embryology is of but little practical value to a medical student, and the small amount he must necessarily know could be given in a very few pages, and is, we believe, usually to be found in works on human anatomy. Considered however as an educational instrument, embryology is of the utmost value. It gives to the student an insight into the meaning of the structures which he meets with in his dissections, and by so doing often renders details of anatomical structure comparatively easy and pleasant of acquisition, which would otherwise be a great and almost repulsive strain on the memory.

Embryology should be taught to the medical student as a comparative science; with the facts duly marshalled, their significance pointed out, and general principles deduced from them. In such a form it ought to constitute an important part of medical training, which every medical school of any pretence to excellence should impart to its students.

We would venture to call attention to the following instances as illustrative of what we consider the unsatisfactory treatment of certain parts of the subject to be found in Prof. Kölliker's work. In dealing with the phenomena of segmentation Prof. Kölliker makes no effort to point out that the differences in the early development of the mammal and bird are in the main the result of the presence of food yolk in the one case and its absence in the other. After reading his very careful and elaborate treatment of the primitive streak, the student would, we think, be left in complete ignorance of the real significance of this interesting structure.

Again, in his account of the placenta, which he describes in man and the rabbit, he has so little to say as to any comparison between the two that we are at a complete loss to understand why he should have made any mention of the former.

In his account of the development of the vascular and excretory systems we are struck with the almost entire lack of any attempt to put the facts which have been so admirably described to their legitimate use, viz. to the explanation of the arrangement of these and other structures in the human body, and of the presence of rudimentary organs.

In making these strictures on Prof. Kölliker's work we should be sorry to convey the impression that we underestimate the value of this in most respects admirable treatise. It has already become justly popular in Germany, and we trust that it will also become widely known in this country.

OUR BOOK SHELF

Bulletin of the United States Geological and Geographical Survey of the Territories, 1879-80. Vol. v. (Washington, 1880.)

THE publications issued by the American Government under the above title are so appreciated in this country that it seems unnecessary to compliment Dr. Hayden and his coadjutors on the appearance of another of their useful volumes. During the last few years, however, there have been brought out by the U.S. Department of the Interior some works by Dr. Elliot Coues, which for

patient industry must compare with any that have ever been compiled in scientific literature. The title of the volume now before us reads as follows:—Art. 26. Third Instalment of American Ornithological Bibliography, by Dr. Elliot Coues, U.S.A., and consists of 545 octavo pages of small print. How many titles of papers and books are quoted in this laborious treatise we should be sorry to have to count. The labour must have been enormous, and it is only those who have to follow the intricate windings of synonymic literature who can appreciate the work here performed by Dr. Coues. We learn that we may expect at some future time a similar conspectus of titles relating to the ornithology of the Old World, but although the present volume professedly deals with American Birds only, many standard works of general interest are passed in review by the author, who exhibits great judgment as a critic. Taking Gray's "Hand-List of Birds" as a basis of classification to follow, Dr. Coues treats of each family separately, and then in chronological order he records every work, every paper, and every note which directly or indirectly affects the American species, and as regards each year the publications are separately entered under the authors' names in alphabetical order. We must however again warn ornithologists that so many collateral references are given to Old World papers where the families are at all cosmopolitan, that therefore no one writing on any group of birds can afford to neglect this book. As for Dr. Coues himself, we can only imagine the sigh of relief with which he must have corrected the last proof of such a toilsome undertaking, although he must have been assured beforehand of the heartfelt gratitude of every ornithological confrère throughout the globe. R. B. S.

- (i.) *Exposition Géométrique des Propriétés générales des Courbes.* Par Charles Ruchonnet (de Lausanne). Quatrième édition augmentée. (Paris, 1880.)
- (ii.) *Éléments de Calcul approximatif.* Par C. Ruchonnet (de Lausanne). Troisième édition revue. (Paris, 1880.)

HAVING noticed both these works on the appearance of the last previous editions in 1874, we need say little here. The reasoning in i., we may remark, is always upon the curve itself, and is not derived by taking the limiting form of the inscribed polygon; and similarly in the case of surfaces. The work has grown from 160 pp. to 174 pp., and there is one more plate of figures.

The pamphlet ii. is, what it is stated to be, a revised form of the last edition. It consists of 64 pp. in place of 65 pp.

Geschichte der geographischen Entdeckungsreisen im Alterthum und Mittelalter. Von J. Löwenberg. (Leipzig und Berlin: Otto Spamer, 1881.)

THIS is a volume in the publisher's Illustrated Library of Geography and Ethnology. It is, as its title indicates, a History of Geographical Discovery in Antiquity and during the Middle Ages. The story is brought down to the time of Magellan and Martin Behaim. The first book, under the heading of Night and Morning, treats of the earliest dawn of geographical knowledge with the Hebrews, Egyptians, Babylonians, Phœnicians, Greeks, and Romans; the second book embraces the period from Herodotus to Ptolemy; the third, the Middle Ages; and the fourth the Century of Discovery, in which Spain and Portugal did such splendid work. Herr Löwenberg has evidently taken great pains to master his subject, and has been quite successful. He treats it in considerable detail, both in its historical and scientific aspects; the arrangement is excellent, and while popular and attractive in style, the work seems to us to be accurate and altogether trustworthy. There are numerous illustrations, some of them rather fanciful, but most of them useful and appropriate—portraits, ships of various periods, maps, some of them reproductions of very early ones, and